

### ABSTRACT OF THE DISCLOSURE

An optical detection system and method detects movement of an optical pointing device in a data processing environment. The system works with any surface than can diffusely scatter a collimated beam from a coherent light source.

5 Specifically, the system comprises a coherent light source and an optical sensing assembly. The optical sensing assembly comprises a plurality of photosensor arrays and a plurality of optical elements. Each photosensor array includes pixels of a particular size and shape. Each optical element has an artificially limited aperture and is associated, through optical matching, with a respective photosensor array. The

10 coherent light source generates a collimated beam that is diffusely reflected off of the surface. The optical sensing assembly receives the diffusely reflected, or scattered, collimated beam and passes it through the artificially limited apertures of the optical elements to the associated corresponding photosensor array. Passing the scattered light through the optical elements generates speckle images that appear on the pixels

15 of the photosensor arrays. Based on the pixel shape, a pixel value associated with the speckle image provides a speckle image data signal. When there is translation of the pointing device, a new set of speckle images, each reassembling to a translated version of the previous speckle image, are generated and another speckle image data signal is generated. The new and the previous speckle image data signals are then

20 used in a motion detection analysis to determine the points of the two data signals that give a displacement value.

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